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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/924,546	08/09/2001	Toshiaki Takase	Q65791	1990
7590 12/20/2004			EXAMINER	
SUGHRUE, MION, ZINN, MACPEAK & SEAS, PLLC 2100 Pennsylvania Avenue, N.W. Washington, DC 20037-3213			JUSKA, CHERYL ANN	
			ART UNIT	PAPER NUMBER
			1771	

DATE MAILED: 12/20/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	<b>Application No.</b>	<b>Applicant(s)</b>	
	09/924,546	TAKASE ET AL.	
	<b>Examiner</b>	<b>Art Unit</b>	
	Cheryl Juska	1771	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) ☒ Responsive to communication(s) filed on 08/24/04 & 09/17/04.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) ☒ Claim(s) 1,5-9,11-15 and 17-38 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1,5-9,11-15 and 17-38 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All    b) ☐ Some \*    c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |   |   |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)             | 4) <input type="checkbox"/> Interview Summary (PTO-413)                     |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)    | Paper No(s)/Mail Date. _____  |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date _____   | 6) <input type="checkbox"/> Other: _____                                    |

Art Unit: 1771

## **DETAILED ACTION**

### ***Response to Amendment***

1. Applicant's amendment filed August 24, 2004, has been entered. Claim 1 has been amended as requested. Claims 2-4, 10, and 16 are cancelled, while new claims 17-38 have been added. Thus, the pending claims are 1, 5-9, 11-15, and 17-38.
2. Said amendment is sufficient to overcome the prior art rejection set forth in section 4 of the last Office Action. However, an updated search of the prior art has produced the following new rejections.

### ***Claim Rejections - 35 USC § 102/103***

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Art Unit: 1771

5. Claims 1, 5, 6, 11-15, 17-19, 23-30, and 34-38 are rejected under 35 U.S.C. 102(e) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over US 6,468,651 issued to Aikawa et al.

Applicant claims a battery separator consisting essentially of a unilayered nonwoven fabric consisting essentially of non-fibrillated fibers, said fibers being a blend of fine fibers (i.e., 4 microns or less) and high modulus fibers (i.e., Young's modulus of 50 cN/dtex or more). The fine fibers are formed from island components remaining after removal of sea component from islands-in-the-sea composite fibers. The nonwoven fabric has an apparent total surface area of 20 m<sup>2</sup> or more, a thickness of 0.1 mm or less, and a uniformity index of 0.15 or less. Said nonwoven preferably consists essentially of polyolefin-based fibers. Alternatively, the surfaces of the fibers forming the nonwoven consist essentially of a polypropylene resin.

The nonwoven may also contain fusible fibers, wherein the nonwoven is fixed substantially only by fusing of said fibers to each other. A ratio of fine fibers to high modulus fibers to fusible fibers is 10 – 40 : 15 – 40 : 20 – 75. The average fiber diameter of the high modulus fibers is preferably 5 times or more than the fine fibers, while the average fiber length of said high modulus fibers is 2.5 times or more than the fine fibers. The nonwoven has a maximum pore size of 40 microns or less and a void rate of 43-65%. Said nonwoven has a tensile strength in at least one direction of 20 N/5cm width or more. The nonwoven may also be treated for hydrophilic properties by a sulfonating treatment, a fluorine gas treatment, a graft polymerization treatment with vinyl monomers, and a discharging treatment.

Aikawa discloses a nonwoven fabric suited for use as a battery separator (abstract and col. 9, lines 11-20). The nonwoven comprises non-fibrillated fibers having a diameter of less

Art Unit: 1771

than 20 microns, preferably fine fibers of less than 4 microns in diameter fused together by adhesive fibers having a diameter of 8-20 microns (abstract). The preferred fine fibers are polypropylene fibers made from the islands of an islands-in-the-sea composite fiber (col. 4, lines 23-42 and col. 9, line 31-col. 10, line 42). The nonwoven may comprise, in addition to the fine fibers and the fusible fibers, "conventional fibers," such as inorganic fibers, polyethylene, polypropylene, and polymethylpentene fibers (col. 14, lines 30-41). [Note applicant's high modulus fibers include polymethylpentene, polyethylene or ethylene copolymers, and polypropylene or propylene copolymers.] The nonwoven has a thickness ranging from 0.005 to 2 mm, an area density of 5 to 200 g/m<sup>2</sup>, and an apparent density of 0.2 to 0.7 g/cm<sup>3</sup> (col. 8, lines 64-67). The nonwoven may be treated to impart hydrophilicity by adhering a surfactant or other hydrophilic agent or by other chemical or physical treatment (col. 9, lines 20-30).

Thus, Aikawa anticipates the present invention with the exception of the claimed properties of apparent total surface area, uniformity index, and Young's modulus. However, it is reasonable to presume that these properties are inherent to the Aikawa invention. Support for this presumption is found in the use of like materials (i.e., nonwoven of fine fibers, fusible fibers, and high modulus fibers of like fiber size) and like processes to form said nonwoven (i.e., wet-laid and fused). The burden is upon applicant to prove otherwise. *In re Fitzgerald*, 205 USPQ 495. In the alternative, the claimed properties would obviously have been provided by the invention disclosed by Aikawa. Note *In re Best*, 195 USPQ 433, footnote 4 (CCPA 1977) as to the providing of this rejection under 35 USC 103 in addition to the rejection made above under 35 USC 102. Therefore, claims 1, 5, 6, 11, 12, 15, 17-19, 23, 24, 27-30, 34, 35, and 38 are anticipated by or obvious over Aikawa.

Art Unit: 1771

With respect to claims 13, 14, 25, 26, 36, and 37, it is argued that the properties of void rate and tensile strength are also inherent to the Aikawa invention. The burden is upon applicant to prove otherwise. In the alternative, said properties would have obviously been present once the Aikawa invention is provided. Thus, claims 13, 14, 25, 26, 36, and 37 are also rejected.

In order to overcome said rejection, it is suggested applicant amend the independent claims with a limitation of one of the dependent claims not rejected under 102/103, as well as submit a statement of co-assignment under 103(c).

### ***Claim Rejections - 35 USC § 103***

6. Claims 7-9, 20-22, and 31-33 are rejected under 35 U.S.C. 103(a) as being unpatentable over the cited Aikawa patent.

Aikawa fails to teach the presently claimed ratio of fibers or average fiber diameter and length of the high modulus fibers. However, it is argued that these features would have been obvious to one skilled in the art. Specifically, it would have been obvious to one skilled in the art to employ the claimed fiber ratio, lengths, and diameters, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. *In re Aller*, 105 USPQ 233. Therefore, claims 7-9, 20-22, and 31-33 are rejected as being obvious over the cited Aikawa patent.

7. Claims 1, 5-9, 12-15, 17-22, 24-33, and 35-38 are rejected under 35 U.S.C. 103(a) as being unpatentable over EP 834 938 issued to Tanaka.

Tanaka discloses a battery separator comprising a nonwoven fabric obtained by heat-fusing and hydroentangling (a) polyolefin dividable composite fibers, (b) high-strength fibers,

Art Unit: 1771

and (c) polyolefin heat-sensitive-adhesive fibers (abstract). The composite fine fibers are comprised of two polyolefin resins in bicomponent cross-section, such as those shown in Figures 1-5 (page 3, lines 28-40). The high-strength fibers are preferably ultra-high-strength polyethylene fibers (page 4, lines 38-42). The composite fine fibers have a length of 20-60 mm and a diameter of 1-10 microns, the high-strength fibers have a length of 30-60 mm and a diameter of 8-30 microns, and the adhesive fibers have a length of 30-60 mm and a diameter of 12-25 microns (page 3, lines 52-53, page 4, lines 9, 23-24, and 34-36, and page 5, lines 8-9 and 11-12). The ratio of composite fine fibers to high-strength fibers to adhesive fibers is 30-60% : 20-45% : 10-40% (page 4, lines 13-16 and 43-45 and page 5, lines 16-19). After forming the nonwoven, it is treated for hydrophilic properties by a sulfonating treatment, a fluorine gas treatment, a vinyl graft polymerization treatment, surfactant treatment, or discharging treatment (page 6, lines 28-32). The nonwoven has a basis weight of 30-100 g/m<sup>2</sup> (page 13, lines 3-5). The exemplary thickness is 0.15 mm (working examples).

Thus, Tanaka teaches the presently claimed invention with the exception of (a) apparent total surface area, (b) thickness of 0.1 mm or less, (c) uniformity index, (d) Young's modulus, and (e) fine fibers formed from islands-in-the-sea components. With respect to the last issue, the method of forming the fibers is only given weight to the extent that the process produces fine synthetic fibers. Once the composite fibers of Tanaka are divided into microfibers, they are not structural distinct from the presently claimed fine fibers. Regarding the claimed Young's modulus, while Tanaka fails to explicitly teach the modulus of the high-strength fibers, Tanaka does teach like polymers. As such, it is argued that the claimed Young's modulus is met by the disclosure of like materials.

With respect to items (a) and (c), it is argued that the Tanaka invention would have the claimed apparent total surface area and uniformity since all the structural and chemical features of the claims are met. In other words, like materials cannot have mutually exclusive physical properties. Alternatively, it would have been obvious to one skilled in the art to produce the nonwoven of Tanaka to have the claimed surface area and uniformity in order to produce a uniform and effective battery separator.

Regarding the thickness, while Tanaka exemplifies a thickness greater than that claimed, it would have been readily obvious to one skilled in the art to decrease the thickness in order to produce a smaller battery. Therefore, it is argued that claims 1, 5-9, 15, 17-22, 27-33, and 38 are rejected as being obvious over the cited Tanaka reference.

With respect to claims 12-14, 24-26, and 35-37, it is argued that the claimed pore size, void rate, and tensile strength of the nonwoven would be present in the Tanaka nonwoven since all the structural and chemical features of the claims are met. In other words, like materials cannot have mutually exclusive physical properties. Alternatively, it would have been obvious to one skilled in the art to produce the nonwoven of Tanaka to have the claimed pore size, void rate, and tensile strength in order to produce an effective battery separator having sufficient strength and permeability. Therefore, claims 12-14, 24-26, and 35-37 are also rejected as being obvious over the prior art.

### ***Conclusion***

8. The art made of record and not relied upon is considered pertinent to applicant's disclosure.




Art Unit: 1771

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Cheryl Juska whose telephone number is 571-272-1477. The examiner can normally be reached on Monday-Friday 10am-6pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Terrel Morris can be reached at 571-272-1478. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

10. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

  
CHERYL A. JUSKA  
PRIMARY EXAMINER

cj  
December 13, 2004